

Appendix H. 2004 Vital Signs Monitoring Workshop Report

Upper Columbia Basin Network (Previously known as Northern Semi-Arid Network) Workshop Proceedings March 9 – 11, 2004 Moscow, Idaho

A Vital Signs Scoping Workshop was conducted at the University of Idaho on March 9 – 11, with representatives from Big Hole National Battlefield (BIHO), Nez Perce National Historical Park (NEPE), City of Rocks National Reserve (CIRO), Craters of the Moon National Monument and Preserve (CRMO), Hagerman Fossil Beds National Monument (HAFO), John Day Fossil Beds National Monument (JODA), Lake Roosevelt National Recreation Area (LARO) and Whitman Mission National Historic Site (WHMI) attending. A new site, the Minidoka Internment National Monument (MIIN) was added since the last vital signs workshop in April 2002. Also, the network has been renamed the Upper Columbia Basin Network.

Network I&M Coordinator Lisa Garrett welcomed participants and introduced the network's newest employee, Leona Svancara, Network Data Manager. Tom Rodhouse, Network Ecologist, provided necessary background for participating workgroups.

Workshop handouts were provided to all participants in a 3-ring binder. The handouts provided information on the Network parks and natural resource concerns identified by members of the Science Advisory Committee. The handouts include the following: Agenda, Purpose of the Meeting and Expected Outcomes, Servicewide Monitoring Goals and Objectives, GPRA Goals specific to UCBN Parks, Potential Partners, Species of Concern, Park Visitation Statistics/Acreage/Designation Date, Prioritized Stressors Affecting Park Natural Resources, Noxious Weed List, Workgroups, Example Vital Sign Categories, Glossary of Terms, and a List of Workshop Participants.

Purpose of the Meeting: Continue the development of an integrated and comprehensive long-term monitoring plan for the network that provides essential information needed to preserve and enhance each park's most important natural resources.

Expected Outcomes:

- Create a network of stakeholders united to preserve the most important resources in the network.
- Review technical information developed by the Science Advisory Committee leading to the development of a long-term monitoring plan for the network's most important resources.
- Develop a list of vital signs and associated monitoring questions that will help track a subset of the total suite of natural resources that park managers are directed to preserve. In situations where natural areas have been so altered that

ecological integrity has been lost, monitoring information can help managers develop restoration plans or ecologically sound management objectives.

Other benefits include:

- Identify major drivers and threats (stressors) to important natural resources within the network.
- Identify protocols that could be used to monitor vital signs.
- Identify partnerships and collaboration potential for maximizing monitoring funds.

Ecological Framework

Network Ecologist Tom Rodhouse spoke of an ecological framework needed to set the stage for the workgroups and the pragmatic/ecological context. He encouraged group participants to “think outside the box,” and across jurisdictions and disciplines, to build the most effective network strategy.

Rodhouse summarized service-wide monitoring goals and objectives as:

- Determine status and trends in selected indicators of the condition of park ecosystems to allow park managers to make better-informed decisions and work more effectively with other agencies and individuals for the benefit of park resources (leverage partnerships for maximum efficiency)
- Note early warning of abnormal conditions to develop effective monitoring and cost savings
- Develop basic research and useable data to better understand the dynamic nature and conditions of park ecosystems, and supply baseline reference points
- Meet legislated protection mandates
- Develop a means of measuring progress toward performance goals

Criteria should be measured in terms of ecological, legislative, management and partnership significance.

Rodhouse cited the definition of an *Ecosystem* as: a spatially explicit unit of the Earth that includes all of the organisms, along with all the components of the abiotic environment within its boundaries.

He further recounted that *drivers* are natural in origin, while *stressors* are generally human-caused, and *disturbances* can be either human-caused or natural. He spoke of the *range of natural variability* and the *critical concept of scale* as contexts for evaluation. In discussing scale, *spatial* includes a range from global to microsite, while *temporal* could encompass, as an example, a geologic range from plate tectonics to daily temperature fluctuation. On an *organizational scale*, both spatial and temporal are considered. Scale has a dependence on status and trend, the dynamic nature of the park ecosystem, and reference points for comparison with other environments.

In summarizing, Rodhouse reiterated that the network objective should be a programmatic integration of the ecological, spatial and temporal. He further stated a National Park Service challenge: “An effective monitoring system will yield information that is greater than the sum of individual parts.”

Garrett stressed the need for the monitoring program to be comprehensive and integrated, yet also specific enough for individual park monitoring requirements. Because of money constraints, she again encouraged participants to form partnerships and develop scientific collaboration that can lead to further educational programs, more precise data and better training.

Garrett spoke of the need to efficiently wrap up this component of the vital signs monitoring plan, with Phase One due June 1, 2004. She stressed that no monitoring will be allowed until the plan has been through the peer review process.

Specialist Presenters

Pete Biggam, Soils

As the only Soil Scientist for the NPS, Biggam addressed the group on the need to raise awareness of the NPS soils programs and the relationship of soils to vital signs monitoring. He stressed that the function of soil directly relates to water and air, plant life, human habitation and other components, and that we need to understand and preserve soil resources. He noted that we should:

- Educate people to the role of soil
- Collect good relative data
- Separate natural and unnatural erosion.

With many of the nation’s soils already mapped, Biggam said today’s soil surveys will be more dynamic and can tell resource managers much about other resources. For example, a soil type classification can furnish further information on plant life and climate, and can even show relationships between critical habitat and endangered species. Biological soil crusts, once disturbed, can be the gateway for noxious weed problems, he said, also noting that some dynamic soil properties are susceptible to change due to climate. Biggam spoke generally of soil resistance and resilience, and stressed that in some instances, good soil health is impossible to restore. Biggam’s overview also included partnership possibilities, protocols and surveys already in existence to help the network monitor its soil resources, and strategies to make the public more aware of soil and its importance.

Elizabeth Waddell, Air/Climate/Land Use

Waddell said that 40 NPS ozone and meteorological monitoring sites exist, but within the network, only Craters of the Moon has a national monitoring site. She suggested, however, that if a park wants to monitor for ozone, it can monitor ozone sensitive plants, observing for foliar injury, reduced growth and increased vulnerability to other stressors. She said all network parks have low risk of ozone pollution except City of Rocks.

Acid deposition is monitored nationally through 37 NPS sites through the National Atmospheric Deposition Program, while there are eight sites nationwide for mercury pollution. She said acid deposition doesn't need to be monitored hourly, but acid deposition risk should include the following criteria: ability of lakes and soils to neutralize it; potential for subtle change in aquatic and terrestrial ecosystems, including species composition; potential for damage to cultural or natural resources; magnitude of potential changes in emission sources (she cited agricultural burning as one example of a source). She stressed the negative effects of acid deposition on plants and soils. She also mentioned related visibility issues. Lichens were noted as an indicator for mercury pollution.

Waddell said that whatever is bad in the atmosphere can often make invasive species worse. She also said air quality is both a stressor and a vital sign. She suggested that measurement and monitoring can tie in with water quality, invasive species and soil moisture issues. Her presentation listed current air quality issues within the UCBN:

- Ammonia emissions from agriculture are forecast to increase significantly:
 - Acid deposition
 - Visibility
 - Fertilization
 - Water quality (nitrates in ground water and streams)
- New coal fired plants proposed for northern Nevada will likely increase:
 - Acid deposition
 - Visibility
 - Ozone
- LARO: metals in water/sediment
- CRMO, CIRO: radionuclides
- CIRO: ozone, nitrogen deposition

Bruce Heise, Geology

Heise identified the following Geologic Features and Processes for the UCBN:

- Glacial features and processes
- Caves and karst features and processes
- Geothermal features and processes
- Stream (fluvial) features and processes
- Lake (lacustrine) features and processes
- Hillslope features and processes
- Volcanic features and processes
- Windblown (Aeolian) features and processes
- Seismic (faults, earthquakes, tsunamis) features and processes
- Unique geologic features (paleontologic resources, geologic age points, geochemical data, etc)
- Disturbed lands/mineral development (mining, grazing, logging)
- Geologic outreach — interpretation and education

Gerry Wright, Wildlife

In a sense, Dr. Wright provided a reality check for the group, noting that people love to talk about monitoring, but not many want to do it. He said that monitoring doesn't come easy and the longest documented vertebrate monitoring program lasted 40 years. He said many programs are dependent on an interested employee staying in place and taking charge. He suggested that if we select things we already know about, we'll be ahead of the game. Wright reiterated the reasons for monitoring, such as early warning, baseline conditions information and legal mandates. Distinguishing between inventory and monitoring, he added that monitoring works best when it's less complex and inexpensive.

Wright identified possible criteria for choosing species to monitor:

- Some species are important in a control function because they are large, dominant and numerous
- Species that are rare and endangered are usually endemic to a certain area
- Is there fluctuation or a state of flux?
- Is the species alien or exotic?
- Is it charismatic?
- Is there a focal species?

Wright observed that there are few commonalities in the network and that each site is a small distinct unit. Bert Frost noted that inventory isn't necessarily what we should monitor, but that we should in fact think outside the box. We should look at what can tell the story and recognize that each park has different needs. At the network level, we can help each other.

Pete Penoyer, Water Quality

NPS Hydrologist Pete Penoyer spoke on the oversight of the Water Resources Division and its directions in I&M, vital signs and funding mechanisms. He said vital signs monitoring requires knowing the condition and managing it, with the directive "to protect and improve." Water quality issues can fall under tenets of the Clean Water Act or be stressor/threat based.

He noted that the following core parameters make the most sense:

- Temperature
- Specific conductance
- The pH level
- Dissolved oxygen
- Qualitative flow

The WRD role in data management is to: organize and compile data, plan and assess, design and implement. Penoyer said nominating a water body as an Outstanding Natural Resource Water (ONRW) can identify water quality and also identify water quality problems.

He outlined the keys to success as:

- Have a strong NPS water quality leader
- Use existing water monitoring protocols
- Partner with others
- Target contracts for practical applied monitoring expertise
- Learn from those who have gone before

Pitfalls:

- Developing protocol on your own
- Synoptic work distraction
- Too many workshops
- Co-opting by other researchers

Steve Bunting, Rangeland/Vegetation

UI Rangeland Ecology Professor Steve Bunting presented an overview of previous efforts to inventory and monitor, with most being at a national level. Although he said there have been efforts from such groups as the EPA, Heinz and the Roundtable Network, there is still a lack of data, especially relating to the network parks. Many of the grassland and shrubland studies have concentrated on soil stability, natural cycles and the presence of a recovery mechanism.

He said that Joyce Heitschmidt listed 16 indicators, among them:

- Land area
- Common types
- Fragmentation
- Threatened and endangered species
- Present vegetation cover
- Productivity
- Ground water
- Changes in fire regimes

Bunting said a qualitative assessment should observe the following attributes:

- Soil stability
- Site stability
- Hydrologic function
- Biotic integrity

Indicators should apply to attributes.

“Working Toward Solutions” Some Work Group Observations

“There’s no simple way to do this...” Ed Krumpe, Workshop Facilitator.

After hearing presentations on each area specialty, the main group divided into work groups to address:

- What's the monitoring question you want answered?
- What are the vital signs?

The objective was to avoid talking about methodology and sampling approaches. The protocol will come later. Monitoring questions should be specific, and not too general so as to help identify protocol and monitoring later.

Workshop participants were further charged to work along both network lines and also be more site specific as they developed vital signs and questions. Workshop facilitator Ed Krumpke provided an example of outcome for the soils/geology work group:

Vital Sign: *Biological Soil Crust*

Monitoring Question: *Is the nitrogen and stabilizing capacity of biological soil crusts changing over time?*

Penny Latham noted that vital signs should be justified and that this approach is being seen at the national level. Mike Wissenbach alluded to the example focusing on soil crust and said soil crusts add to the landscape and add another level of questions.

Work groups were assigned as follows (group leader identified under heading):

Vegetation	Wildlife	Soils/Geology	Water/Riparian	Air/Climate/Land Use
Bunting (L)	Wright (L)	Heise (L)	Penoyer (L)	Waddell (L)
Wolken	Garton	Biggam (L)	Braatne	Apel
Gasser	Rodhouse	Davis	Fisher	Lyon
Hilty	Sauder	Coyner	Hyde	Svancara
Latham	Carter	O'Meara	Leonard	VanderVoet
Kopper	Frost	Hughes	Weaver	Trick
Baun		Wissenbach	Garrett	Elwell
		Gruchy	Pearson	Monsanto
(L) – Group Leader				

Student facilitators were Shannon Amberg, Lynn Westerfield, James Gandy, Jeremy Frary, Steve Best, Becky Wiles.

Work Group Dynamics

Day One of the workshop focused on goals, recap and special presentations. With goals clearly defined, Day Two divided the group into work groups. Each work group approached objectives differently, so this section describes some of the dynamics of each group in order to show how questions and vital signs were developed.

Soils and Geology

This group began with a general discussion of how both soils and geology relate to other spheres such as water, cultural resources, etc. From there, the NPS soil scientist encouraged group members to look at soils formats from other groups. Others mentioned the more holistic approach developing in resources, which moves away from the limited focus on vegetation and wildlife. The group reiterated the need to choose vital signs and monitoring questions within the contexts of ecological, management and partnerships aspects.

After an hour of discussion, the group had hammered out geological issues as follows:

Glacial	Caves	Hillslope
Seismic	Geothermal	Disturbed lands
Stream	Volcanic	Geological features

The soils list focused on:

Erosion	Soil biota	Soil aggregate stability
Soil compaction	Soil biological crust	Soil hydrophobicity
Soil disturbance/impacts		

At this point, one of the group's two soil scientists noted that soils are more related to plant life than to geologic aspects. The soils people also questioned how certain geologic functions can be monitored, and agreed that soil types find commonality among the parks, while geologic aspects should be evaluated park by park.

Eventually, the network coordinator allowed the soils members to leave the work group and formulate their own vital signs and questions, while the remainder of geology members worked toward separate goals. The division of the two specialties especially benefited the soils group. Because both members had wide field experience and had worked with national soil surveys, they were able to formulate strong questions with accompanying vital signs based on experience.

Later in the group-wide discussion, one of the soils members explained that breaking away from geology enabled them to rank stressors and work with already identified areas of interest. The vegetation link proved a source of good monitoring questions, particularly as soils properties related to invasive species. Soils people also noted links to fire and agricultural practices.

Air/Climate/Land Use

The group leader facilitated her members in immediately identifying several questions, most based on her expertise. Relying on her earlier presentation from Day One, she and group members were quickly able to pinpoint follow-up monitoring questions and developed the following list in the first hour:

- How are the atmospheric emissions from agricultural land use affecting ecosystems? Specifically:
 - Visibility

- Fertilization
- Pesticides
- Acidification
- Nitrates to surface
- Ground water
- What air quality data is needed for our affirmative responsibility under the Clean Air Act and our partnership with the regulatory agencies?
- How is air quality affecting historic and natural viewsheds?
- How is air pollution and light pollution affecting night sky?
- How are parks being affected by ozone now and in the future?

After tackling air quality aspects, both the leader and members admitted that they stalled in developing questions on climate because of the group's lack of background in climate issues. In addressing land use, they relied on a matrix to identify areas of concern and cause and effect. The matrix follows:

<u>Land Use Effects</u>	<u>What's Affected?</u>
Ranchette development	Scenic viewshed
Landscape fragmentation	Cultural landscape
Changes in industry	Air quality
Changes in transportation	Soundscape
Livestock	Visitors
Recreational preferences	Range health
Encroachment	Water availability

An emerging question: How is public and private land use on adjacent land affecting the parks?

Furthermore, how are changes in recreational uses and activities affecting park resources (for example, how is rock climbing affecting City of Rocks?).

It is noteworthy that this group developed no site-specific monitoring questions, but did gather valid commonalities to formulate several questions. The matrix seemed to jell thinking and might help in developing further network-wide and site-specific vital signs and monitoring questions.

Water Resources/Riparian

Discussions revolved around park managers wanting to be involved in monitoring, as the work group approached its goals. The group facilitator noted that financial resources in each of the network parks to manage water resources is limited and many issues depend on park policy.

An hour into the session, the group was focused on sorting out water issues such as seasonal water patterns, water fluxes and differences from historic conditions. Because of varied management policies, some felt such items couldn't be monitored as vital signs.

One group member suggested differentiating between anthropogenic and natural, and felt core parameters can tell basic information about streams, etc. Such things as channel flow and sediment distribution might help develop profiles and dimensions to be maintained.

An abundance of water regulation and law was brought up, with these key considerations:

- Water rights and adjudication
- Cultural landscape
- Regulation and legislative limitation mandates
- Cooperators/neighbors
- Staff limitations

The group agreed to brainstorm, develop 10 questions, and then fine-tune further. One member of the group felt baselines were needed to note changes and others agreed that changes in staff, new programs and staff and agency turnover often made it a “reinvent the wheel” scenario. The NPS hydrologist said this program was to remedy that situation and provide coordinated documentation.

Another member brought up riparian management field experience based on compatible users and agencies. He felt that might provide a model from which to work on possible partnership aspects.

Wildlife

Members of the group began discussions around species population status, distribution of threatened and endangered species, and species of concern. Bats were also discussed. The group decided it was best to zero in on resident species and species of concern for each park, due to the variability of wildlife at each site.

Discussions centered on:

- Key species
- Habitat types
- Groups of species that are vulnerable

There was also discussion on distribution, which in some cases is already known, as contrasted with abundance. This distinction should be reflected in monitoring questions, as well.

The group began its questions with:

- What is the population status of species of concern within each park?
- The species of concern within a park is part of a group habitat

Vegetation

The vegetation group wrestled with a variety of issues, but a strong discussion emerged early in the session on sagebrush because of its presence at most sites. Members noted the links between soils and plant life, and also discussed sagebrush communities, boundaries and other aspects.

Concerning monitoring, some felt there should be baselines and that such information might already exist in other surveys. The hope was to keep inventories simple with perhaps aerial photography every five years because it is relatively inexpensive and can be contracted out. Further, fire regime conditions and classifications can be used as an analysis tool for landscape level monitoring. This brought on more in-depth discussion about what is meant by landscape and watershed, because some felt it was perceived differently at each park.

One question began to take shape on what vegetation should look like and how dysfunctionality might be assessed. The hope was to bring monitoring down to a manageable level, with partnerships again desirable to help defray costs.

Working well into the session, the group had trouble finding commonality because vegetation covers a broad spectrum at the network sites. The general focuses that emerged were:

- Nutrient cycles
- Invasive species
- Plant communities in flux
- Altered hydrological regimes
- Fire regimes
- Plant diversity

Links were again discussed between soil, hydrology, fire and climate. Getting more specific, the group thought it would be worthwhile to distinguish between human-imposed hydrological conditions and natural ones.

Final Session

After the various work groups brainstormed through the morning session, they reconvened in the afternoon, breaking into new groups that reflected other areas of interest. This was to maximize expertise and also draw people into new thinking patterns. “Think outside the box” in other words. After the second session ended, the whole group met to evaluate questions developed in the various work groups. Questions were put up on a screen and subjected to group scrutiny, with some questions obviously repeated by different groups.

Geology identified no vital signs, but developed a dozen questions. The group worked park by park because geologic attributes were clearly distinct. In one comment, a member outside the geology group noted that most questions seemed to involve monitoring in the context of a cultural resource rather than according to geological processes. Questions were rephrased by the general group, and duplicate questions were eliminated. Once again, group members noted the difficulty in monitoring geological processes, but wondered about issues such as gullification and erosion.

The soils group illustrated the idea of developing questions with a network-wide focus, and showed the integration of soils with other elements such as plant life and species of

concern. Members of the soils group noted that they looked at the ranking of stressors and made links, which the group at large agreed could make protocols and monitoring easier, more efficient and less costly.

The water quality group acknowledged how much their questions were related to legal mandates and use. They felt questions should involve how waters are being maintained and how they're changing.

The air quality group's matrix was viewed as a positive help in developing further monitoring questions. Again, the group pointed to legal mandates as a heavy influence in building appropriate monitoring questions.

The vegetation group acknowledged the difficulty in devising questions that went from general to specific, but felt a legitimate focus could be on invasive species and natives, and frequency of invasions. The group at large suggested that a more specific question might be: Are isolated kipukas being invaded by non-native plant species?

Common threads found in the general wrap-up included:

- Difficulty in thinking beyond a specialty or area of expertise
- Moving from general to specific
- Working within legal mandates and the tangle of uses and laws
- Maximizing potential by linking elements such as soils and vegetation
- Park operations and vital signs aren't always in harmony

The late afternoon session was devoted to compiling a list of vital signs and monitoring questions with input from the workgroups. A spreadsheet was projected at the front of the room and group leaders assisted in writing up the monitoring questions that were formulated in their group. The final list contained over 100 questions. This list will be further refined and placed on a website for additional input. As the workshop concluded, all agreed there is more work to do, but a beginning group of vital signs and questions was developed as a starting point.